sistance of shortened muscle and fascia. When the head is over the acetabulum it may, in some instances, be thrust into the socket by firm pressure inward over the trochanter. Sometimes this maneuver has to be combined with abduction of the leg, made while the traction is maintained, the operator pressing the while firmly on the trochanter and supplying a fulcrum so that the head may be made to travel downward and inward and jump over the acetabular rim into the socket. There is one objection to the traction for it makes a pull on the anterior fibres of the capsule and narrows the opening, and so occasionally one finds that, after reasonable efforts at it, in which the capsule has probably become somewhat stretched, flexion of the hip and manipulation of the leg—the direction of the movements being guided by the finger in the joint—succeed in slipping the head into the acetabulum with the use of no force at all. In not a few instances, in young children, two to four years old, this may be done primarily, without the preliminary pull on the leg.

In a fair proportion of these cases there is a twist of the upper part of the femoral shaft so that the neck and head look forward when the toes are pointed in the same direction. Whether this is the case or not can always be determined by radiograms, one taken with the toes pointing forward and another with the limbs rotated out. If there is the twist forward in the bone, it will be necessary to compensate for it by rotating the whole limb inward during the manipulations to direct the head into the acetabulum. Once the head is in the acetabulum the limb is put into a position of abduction, of from 50° to 90°, and rotated in or not as may be necessary. This position thrusts the head more firmly into the acetabulum and prevents reluxation. The two retracting loops are now tied together to close the upper part of the incision in the capsule. The lower part of the incision has, by the act of reduction, been carried so deeply into the limb that it cannot be reached to be sutured. Sutures are then put in the fascia, deep and superficial, leaving space for the insertion of a cigarette drain down to the capsule. Finally the skin is sutured and then both limbs and the pelvis put into a double plaster of Paris spica. Even if but one hip is operated upon both limbs must be included in the first retentive plaster dressing. After forty-eight hours the drains are taken out, and, if there has been no sepsis, the leg is left undisturbed for three months. If sepsis occurs it is right to reluxate to avoid an anchylosed hip.

After three months the spica is taken off, and the limb adducted somewhat and another spica put on, including only the leg of the side of the operation in the one-sided cases, both legs in the double cases. After another month or so this may be arranged so as to leave the foot free, and the child may then be made to walk in the plaster. After six months have elapsed the spica may be made only to include the thigh and pelvis, leaving the knee free. After eight or nine months this retentive dressing may be left off entirely.

Southern California Hospitals.

The hospitals and sanatoria in the southland are almost constantly expanding and developing. Dr. Pottenger, Chairman of the Committee on Tuberculosis of the State Society, has met with remarkable success in the development of his sanatorium at Monrovia and has had to double its size, the addition being completed only recently. Already it is full and he is, we understand, contemplating still further expansion and equipment. The Good Samaritan Hospital in Los Angeles has recently installed what appears to be as nearly a perfect call system as it is possible to devise, together with many other improvements. The California Hospital, also in Los Angeles, has under way, and now nearly completed, a very considerable addition to its buildings. This new portion is built of brick, like the maternity pavilion, and adds largely to the accommodations of the hospital.

REPORT ON AN EPIDEMIC OF DIPHTHERIA.*

By RAY LYMAN WILBUR, M. D., Stanford University.

IT IS MY aim to present to you in this paper a brief report on forty-three cases of diphtheria that recently came under my observation, and also to outline the methods used to prevent the spread of the disease, particularly by the prophylactic injection of antitoxin. These forty-three cases do not represent all that occurred at the time of the epidemic, but only those actually seen by me either in consultation or as private patients.

In December 1903, and subsequent to that time, particularly during last June and July, several cases of diphtheria occurred in Palo Alto and on the Stanford University campus. Some of these cases were severe and one death resulted, but during the month of August there were no new cases. With the return of the students from their vacation early in September new cases began to appear. The origin of these early cases was obscure and in no one of them could be traced absolutely to a definite source. Some of the infected students reported diphtheria as prevalent in their home towns. In none of the early cases could a history be obtained pointing to contact with any previous diphtheria patient in the neighborhood, or with any apartment formerly occupied by such a patient. Many of the later cases that appeared were evidently from association with the earlier ones. A number of them came from two cases that were left, wrongly diagnosed, in a dormitory for almost a week. The first case of this series came under observation early in September and the last one was discharged the latter part of October.

General Character of the Cases. A majority of these cases were of the pharyngeal type and occurred in young adults although there were eleven children under ten years and two patients over forty years of age among them. While some of them were quite severe, the major portion of them were diagnosed early and were treated promptly by antitoxin so that the throat condition was not serious at any time. Four only of this series had a laryngeal affection; two of these being under three years of age. There were three buccal, one nasal, and one conjunctival infections, and three had post-diphtheritic paralysis or neuritic symptoms of some sort. None of the laryngeal cases required intubation although only the use of large doses of antitoxin promptly given and frequently repeated saved two of them from laryngeal occlusion. There were no deaths among the patients in this series and all but one were treated with diphtheria antitoxin. This one case was seen about four weeks after the appearance of the membrane for paralysis of the soft palate and a right hemiplegia, and the patient had been treated by a druggist by the use of gargles. The clinical diagnosis of most of the cases was easy. They usually began with headache, malaise, marked pain on swallowing, temperature up to a hundred and two degrees or a hundred and three degrees rapidly sinking to subnormal. Usually the throat had a purplish congested look, and the anterior cervical glands were swollen and tender. The membrane in the beginning was ordinarily of a greyish white color confined to the tonsils and adherent, its base bleeding readily when the membrane was disturbed. As a rule this spread rapidly to the soft palate. The uvula when involved usually became adherent to one of the tonsils.

It was found of great importance to carefully examine all throats with the aid of a head mirror and a swab or probe in order to detect a beginning membrane. Frequently small patches were found on the tonsil completely hidden by the anterior pillar, and a diagnosis was made by culture from them in time to prevent a severe involvement of the throat. In one case the patient had been seen by a physician

*Read before the California Academy of Medicine, December, 1904.

a couple of times because of pain in swallowing, headache, etc., and his throat seemed to be clear, but when the soft palate was elevated a membrane was found the size of a five cent piece at the apex of a very long highly-placed tonsil. It was also found of importance to carefully examine the teeth. In two cases where an incoming wisdom-tooth had injured the gum a diphtheritic membrane had formed there, and in another the presence of an alveolar abscess seemed to prolong the tenancy of the Klebs-Loeffler bacilli in the buccal cavity.

Smears made from the membranes of these cases usually showed the presence of typical bacilli, but in no case was a positive diagnosis made before the growth upon blood serum had been examined. In making cultures it was the rule not to use the swab if membrane was present, but to tear off a piece of membrane with a sterile scoop and rub it over the surface of the culture medium. It was usually possible to find plenty of bacilli within fourteen to sixteen hours, although twenty-four hours was sometimes necessary.

Several interesting border-line cases occurred which showed bacilli of various sizes and shapes in smear and culture, and which were characterized by the presence of a whitish non-adherent mucus exudate usually present upon the tonsils only. Cultures from these cases were submitted to bacteriologists with varying results. During the epidemic several of the ordinary staphylococcic tonsillitises and two severe cases of streptococcic infection of the throat came under my observation. In one of the latter a membrane covered both tonsils for thirty-six hours but was readily dissipated by local treatment. In another case diphtheria bacilli were found along with large numbers of oidium bodies. After the use of antitoxin the Klebs-Loeffler bacilli disappeared, but the scattered adherent patches persisted on the tonsils and the posterior wall of the pharynx. Cultures made from them showed numbers of oidium bodies two months after the throat was first seen. Cultures from this case were submitted to Dr. H. R. Oliver, and were thought by him to correspond to organisms described by him as the cause of a chronic membrane in the throat.*

This case shows the advisability of making frequent cultures from throats where a membrane persists after the use of antitoxin.

In another case a smear made from a throat which had some patchy exudate upon the tonsils and a small but adherent patch upon the uvula showed bacilli resembling the Klebs-Loeffler bacilli. A culture was taken and simple gargle ordered and a thousand units of antitoxin given. The culture was positive, but when I returned twenty-four hours later to report the result to the patient, the exudate had completely disappeared from the throat and the second culture was negative.

Temperature. In only a few cases did the attack manifest itself with high temperature. In these numerous streptococcic were found mixed in with the Klebs-Loeffler bacilli. The presence of a temperature of over 103° was usually associated with a staphylococcic or a streptococcic infection and the presence of sustained temperature spoke against the diagnosis of diphtheria. Between 100° and 101° was the commonest elevation noticed and this usually sank within three days after antitoxin was given, to subnormal. About two-thirds of the patients had a subnormal temperature for five or ten days and frequently complained of having cold extremities and being chilly. In three cases the temperature went as low as 96° each morning for several days.

Circulation. Very few of the patients in this series of cases escaped some abnormal changes in the heart rate or action. About one-third had a pulse rate of from 40 to 60 from the fourth day to the fourteenth. This was frequently followed by a period of rapid pulse rate 100 or over with an evening rise of temperature to 99.6° to 100°. Five patients were found with murmurs or developed them during convalescence. Circulatory collapses occurred in two patients and were repeated twice in the same patient. They came on in the third week, were sudden and somewhat alarming, and were accompanied in each case by a sudden nausea, great weakness, pains in the joints with the prompt appearance of a very severe urticarial rash, amounting in one case to an acute edema of the back and sides of the trunk.

Nervous Disturbances. Headaches and sleeplessness were the commonest nervous symptoms. One case of post-diphtheritic paralysis has been alluded to. Two other cases of paralysis of the palate in improperly treated patients were reported to me by other physicians. One patient in my series had an attack of herpes zoster five weeks subsequent to the diphtheritic infection and another had tingling and some anesthesia with slight failure of co-ordination in both arms six weeks subsequent to infection.

Albuminuria. Albumin was found in the urine of one-fourth of the patients and was usually accompanied by hyaline tests; in those followed up, it disappeared within four weeks.

Rash. In three other patients besides those previously mentioned a severe rash appeared usually about sixteen days from the onset of the illness. The trunk and limbs were most affected. Accompanying the appearance of the rash there was a rise in temperature, frequently pain in the joints, itching and burning of the skin, and marked nervousness. Within thirty-six hours the rash usually disappeared, often to return again transiently for a few hours.

Special Cases. The case of conjunctival diphtheria is perhaps worthy of special mention. The patient had an area the size of a dime on the lower outer tarsal conjunctiva of the right eye. It did not involve the eye-ball and attracted the patient's attention more because the lymph glands in front of the ear and along the neck became suddenly swollen and painful. He had the feeling that something was in the eye and the lower canthus was drawn down and the lower lid slightly averted. His temperature was below 100° and except for a general feeling of malaise, headache, and lack of appetite he complained of nothing. The throat was at first clear, but later some small patches of membrane developed upon the tonsils. The patch on the conjunctiva had a soft base, was irregular in outline, light grey in color, slightly elevated and with well-defined edges. A culture made from a piece of detached membrane showed a pure culture of bacilli, presenting microscopically all of the morphological features of the Klebs-Loeffler bacilli. No animal experiments were made. Antitoxin was promptly given and for a short time there was no local treatment in order to test the therapeutic effect of the antitoxin. After the first injection the progress of the infection was stayed and after 12,000 units had been given the patch gradually shrunk somewhat and the glandular swelling became smaller and less painful. Ice and ichthyol ointment were applied over the glands and later boric acid solution and calomel powder were used in the eye. The patient ran a very irregular temperature. Within a few days from the beginning some discharge appeared in the conjunctival sac and cultures showed staphylococci present. No Klebs-Loeffler bacilli were found at the end of three weeks; the patches disappeared from the throat soon after and the patient was discharged at the end of a month, although the glands were still somewhat enlarged. It was feared at first that the lesion was a chancre, but the prompt reaction to antitoxin and the progress of the case seemed to make a diagnosis of diphtheria clear.

Treatment. With one exception all the above patients had from 4000 to 36,000 units of diphtheria antitoxin. An effort was made to administer this as promptly as possible after the case came under observation. When there was a suspicious appearance of

* *California State Journal of Medicine*, August, 1904, page 240.

throat, 1000 units were given. If the clinical appearance pointed strongly toward diphtheria, 4000 were given at the time the first culture was taken. The results from the use of antitoxin were most satisfactory. Within twelve hours improvement was usually evident. The throat became less painful, the glands less tender, the membrane began to shrivel slightly and to loosen at the edges. If the membrane did not promptly separate the antitoxin was repeated within six or eight hours. The laryngeal cases were given 4000 units every four to eight hours until improvement was noted. No attempt was made to use a minimal dose but the antitoxin was used whenever the membrane seemed adherent or inclined to spread. Frequently when small areas lingered on the tonsils three or four thousand units would promptly loosen them. In some cases new membrane formed rapidly over the site of the previous one, and in the nasal case, after a mass the size of a small oyster had become loosened and was removed by forceps from each post nares, membrane formed over the tonsil and required more antitoxin to loosen it.

The value of the antitoxin needs no corroborative testimony from me but the results were frequently so striking as to amaze one. The sense of security, that its use gave the patient, as well as the physician, was of great help in controlling the epidemic. In fact, it worked so well sometimes that it was hard to convince the patients that the diagnosis was correct.

The limitations and value of the use of antitoxin were illustrated in one family where, because of probable exposure to a case in school, one of the children in the family came to me. He complained of some dryness and pain in the throat, but only came to get a prophylactic injection of antitoxin. Upon examination small greyish adherent patches were found on both tonsils which showed Klebs-Loeffler bacilli. A visit to the house showed that the three other children, the father and mother and Japanese cook all had patches on their tonsils. Injections of antitoxin were given to all, varying in amounts and repetition, according to the amount of membrane. All did well from the first except the Japanese, whose membrane extended over both tonsils and the uvula for a couple of days before disappearing. In a few days they were all so well that some of the family became skeptical of the diagnosis, but the youngest child, who had received only 2000 units and who, except for one small persistent patch on the tonsil, was apparently well, two weeks later ran around the cold floor with bare feet for an hour or so. Immediately the throat became very painful and a membrane involving the whole pharynx developed and was only controlled by 24,000 units of antitoxin.

Besides the antitoxin the principal treatment was in the use of proper diet, the procuring of rest, the frequent use of simple alkaline gargles, and the application of various external agents, ice, ichthyol, etc., to the neck to relieve the pain of swallowing or to prevent edema in some of the severer cases.

Diet. An effort was made to give each patient nourishing simple food that could be easily swallowed, and for ten days light diet was the rule. If during that time albumin was found in the urine, milk was made the basis of the nourishment.

Rest. I was particularly impressed with the desirability of having as near absolute rest as possible, even in the mildest cases, especially as long as any exudate lingered in the throat. Afterwards even before the throat was bacteriologically clean, unless the pulse was too slow or too irritable, a certain amount of fresh air and moderate exercise seemed most beneficial.

Gargles and Sprays. Strong antiseptic solutions were not found to be of benefit except in cases where the lacunæ of the tonsils continued to fill with an exudate rich in diphtheria bacilli. Here, tincture of ferri chlor in glycerin aa was found useful. Dobell's solution or some other alkaline gargle, frequently repeated, gave the patient comfort and seemed to do as much good as any other form of local treatment tried. When a rash occurred it was usually promptly relieved by thorough purging, and the use of alkaline washes or carbolic acid in a solution of magnesia applied locally.

Recovery. Recovery in even some of the mild cases was quite prolonged and for two months after the onset most of the patients reported themselves as still feeling the effects of the disease in lessened energy, more frequent headaches, etc. Still, two of the men who had extensive membrane formation with marked systemic symptoms recovered rapidly enough so that by careful training they were able to play in an intercollegiate football game within a month after leaving the hospital, and they suffered no ill effects therefrom.

Rash. The question as to the antitoxin as a cause of heart failure, albuminuria, nervous symptoms, etc., need not be gone into here, but as the causative factor in the appearance of the rash a word might be added. In the diphtheria cases the rash sometimes came where fairly considerable amounts of antitoxin had been given, and seemed prone to come where the membrane had been resistant to the antitoxin and suddenly loosened, leaving perhaps a considerable amount of surplus antitoxin in the blood. Among the individuals given prophylactic doses I saw only three cases of urticaria. This was in one case, my own, purely local and limited to the sight of the injection, and, while accompanied by severe itching and burning, only lasted a couple of days, but recurred upon subsequent injection. I saw four cases of general urticaria, probably gastrointestinal in origin, in patients, who had neither diphtheria nor antitoxin during the time that the diphtheria was prevalent. Some cases of rash with diphtheria where no antitoxin was given have recently been reported, and I reported to this society several years ago a short series of cases of follicular tonsillitis accompanied by rashes similar to those seen during the present epidemic. I am inclined to believe that the diphtheria antitoxin gets the credit at times for eruptions upon the skin caused by the absorption of toxin from a mixed infection of the throat or due to digestive disturbances.

General Plan of Control of the Cases. In getting control of the present epidemic the plan of procedure was to consider all cases of throat infection, no matter how mild, diphtheria until cultures had proved them otherwise. The suspected patient was kept by himself in his room until the diagnosis was made. When the diagnosis had been made the patient was either quarantined where he lived or sent to a hospital arranged for such cases. All directly exposed individuals, and by this was meant all those living in the same house, including servants, or those eating at the same table, had their throats examined and had their choice between being quarantined for a week or ten days to see if the disease would develop and receiving a prophylactic dose of antitoxin. The latter alternative was invariably chosen, although a couple of days of quarantine was sometimes needed to bring about a proper appreciation of the value of antitoxin. Where one or two cases had been found in a fraternity house or a club, injections were given to all and they were all instructed to use an antiseptic gargle. All of the dishes were boiled in soda solution. The rooms of the diphtheria patient were shut up and promptly fumigated with formaldehyd. In five instances at least eighteen or twenty people had been in direct contact with the diphtheria patient and yet in none of them did diphtheria develop after antitoxin was given. In all I have a record of 287 prophylactic injections of antitoxin. By far the greater part of these were given to those directly exposed to the disease although in a few families it was given as a precautionary measure. Its value was very great. At first a few injections of 500 units were given, but in one boy, two weeks following an injection of that amount, a small membrane developed, so that a dose

of 1000 was made the rule. Not a single one of this series of 287 developed diphtheria except as just noticed. As two weeks is considered as the early limit of the prophylactic effect of the antitoxin, the percentage of cases of diphtheria occurring in this series of prophylactic injections is practically nil. The nurses who cared for these patients were advised strongly to take antitoxin. Two did not until a membrane began to develop in their throats, but by the prompt use of antitoxin they were soon able to go on with their work.

Certainly we have in the prophylactic use of antitoxin a most efficient means of controlling diphtheria epidemics. With the small volume of serum now needed to give 1000 units of antitoxin it is a very simple thing to administer. I found the loose tissue under the left shoulder blade, the best place for the injection as the process could not be seen by the patient and caused very little pain. Occasionally there was numbness and tingling in the arm upon injection, but it soon disappeared. Muscular exertion soon after the injection was often painful and left considerable soreness. This was noticeable in cases I saw that had been injected in the arm or leg. There was an occasional complaint of headache or dullness and frequently the parents reported that a child had slept at an unusual hour or unusually long following the administration of the antitoxin. In two cases a sharp local reaction followed the injection of curative doses and caused great swelling and pain. A free purgative with the application of local moist heat soon brought things to normal.

Disinfection. The rooms of diphtheria patients were carefully treated with formaldehyd vapor. As ordinarily used it did not seem very effective and someone even reported a live fly in a room after the formalin fumigation was over, but when combined with steam in the generator or when water is allowed to boil in the room while the formalin is being evaporated it is, especially when used with the formalin spray, I think, the best means we have of fumigation in private houses. The duration of the quarantine of these cases varied from one week to four. Patients with large tonsils full of crypts retained the bacilli in them and the throat longer than others. The first sign of the disappearance of the bacilli was usually a marked anemia of the throat. All patients were held until two successive negative cultures taken twenty-four hours apart were obtained. If any exudate was present on the tonsil the culture was made directly from it. The greatest difficulty experienced was in keeping the patients contented in quarantine after they felt well and the throat seemed clear. No method of gargling, etc., tried seemed more effective than another in hastening the disappearance of the bacilli. Occasionally an injection of antitoxin even when the throat was free from membrane seemed to shorten the clearing up of the bacilli from the throat.

Looking back over the epidemic and considering the number of cases seen in about six weeks time, and the opportunities offered by the dormitory and club house for the spread of the disease it is certainly gratifying to record that no new cases have appeared for about two and a half months. I take it that this shows the value of strict quarantine and the free use of prophylactic injections of antitoxin in controlling diphtheria.

When you move, do not forget to send your change of address to the office of the Society immediately.

POST-OPERATIVE VENTRAL HERNIA—ITS CAUSES AND PREVENTION.*

By C. GEO. BULL, M. D., Alameda.

THAT hernia of the abdominal wall may follow celiotomy is too well known to require more than a bare statement. Its frequency varying from 1% in clean cases to between 20% and 25% in septic cases is very suggestive. Let us first, however, examine into its more frequent causes and we shall then be in a better position to determine how to prevent it.

The main causes are briefly as follows:

Drainage; a relatively long incision; wounds healing by granulation; failure to bring fasciæ into proper apposition, resulting from method of suture, tension of fascia, direction of incision, etc.; division of nerve supply to the muscles of the abdominal wall, usually more frequent in section for operations on the biliary tract, by reason of the oft times unavoidably long incision and consequent destruction of motor terminals of the intercostal nerves, though hernia above the umbilicus is somewhat rare; vomiting or straining from any cause and abdominal tension from flatus may provoke hernia if occurring before the wound is firmly united; and finally, according to Kelly, patients rapidly accumulating adipose tissue after operations, thus increasing intra-abdominal pressure.

Drainage. Hernia appearing in the scar was undoubtedly more frequent when drainage was the rule and I think surgeons are pretty well agreed that more hernias occur after drainage in abdominal operations than after sections that are not drained. The reason is obvious, inasmuch as we obtain imperfect fascial and muscle approximation at the site of the drain and often a poor quality of granulation tissue. "The frequency of hernia after operation for appendicitis with abscess," says Deaver, "is a strong argument for early operation." This brings up the question of whether to drain or not. Not long ago, drainage was customary, especially if the slightest doubt was entertained as to its propriety. Now, the reverse obtains and, of the many abdominal operations I witnessed both in the East and in Europe last summer, I recall but two in which drainage was used. We know that the peritoneum can dispose of septic fluids as well as even fair sized septic masses if its vitality be intact and this ability of the peritoneum, or its resistance to infection, is much more marked in some individuals than in others.

Dr. Stillman† of San Francisco, made the assertion, in a paper read before the State Society at Santa Barbara two years ago, that more cases of septic peritonitis recover without drainage than with it. Of course, this excludes pus cases. Pus in the abdomen must be evacuated and drained just as it is elsewhere. Olshausen, of Berlin, at whose clinic I spent some time last year, teaches that the peritoneum as a whole can not be drained, but will drain itself toward the diaphragm if unmolested, always providing the toxemic condition be not too virulent, so as to destroy its function. Rather than drain an acute, advancing peritonitis and thus nullify by interference what little resistance to sepsis it still had, I would wait till its violence began to subside, unless there were pus present or perforation. If then, we drain only in pus cases—and many of these do not need drainage if the abscess is localized and can be thoroughly wiped out; e. g., the pus about a ruptured appendix or tube prevented, by limiting adhesions and by gauze introduced for the purpose, from soiling the peritoneum—we will correspondingly diminish our hernia possibilities. If drainage is used, however, it is a safer proposition to suture the fascia at the site of the drain after its removal. This should be especially insisted on if the drainage has been prolonged, the liability to hernia being thereby rendered greater.

*Read before the Alameda County Medical Society, January, 1905.

† *California State Journal of Medicine*, Volume I, page 334.